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in confirming or modifying this view. In Greenland it is associated with ferns of the order Gleicheniales and at least four species of *Cycas*, all of which goes to prove that the climate at the time they grew was probably tropical, or at least very warm. In North America the Laramie bread-fruit tree was associated with an abundance of palms, which also argue a warm climate, but in the same beds are found a host of genera (*Salix*, *Populus*, *Quercus*, *Juglans*, *Carya*, *Magnolia*, *Ginkgo*, *Taxodium*, *Sequoia*, etc.), which point with stronger force to a probably temperate climate. The Pacific coast species was found with genera usually relied upon to prove a temperate climate, and while it was undoubtedly warmer than now, for the present forest vegetation is mainly or largely coniferous, there is little beside this to show that it was actually tropical.

NOTES ON MARS AND METEORS.

BY E. MILLER, LAWRENCE, KANSAS.

THE recent opposition of Mars, the appearance of Holmes's comet, and the meteoric display of the night of Nov. 23, 1892, were events that concentrated the attention not only of the general scientific world, but of specialists also, more largely than such events ever did before. It was thought that some of the celestial riddles were about to be solved, that some positive addition, neither nebulous nor fragmentary in its character, was to be made. Now, that they have all become things of the past, and it becomes possible to sum up the results of all the labor performed, theories propounded and exploded, and computations made, it is no wonder that the "*οἱ πολλοί*" ever impatient to see tangible results, and always clamorous in demanding large returns for even the smallest expenditures of time, labor, and money, are shouting "imposture." But science is not to be balked in this way; there is no release from this war.

The position of Mars relatively to the earth was such during the recent opposition that the best instruments and the best observers were at a great disadvantage. The results were not altogether satisfactory and in many cases were at variance with old theories and with each other. The observations made in this country, east of the Rocky Mountains, were scarcely of any value at all in the most of them, owing to the hazy condition of the atmosphere, as well as the low altitude of Mars. But west of the Rocky Mountains, especially along the Pacific coast, notably at Lick Observatory and the mountain observatory, near Arequipa, Peru, the conditions were the best attainable. At Guaymas, Mexico, on the coast of the Gulf of California, in latitude 27° 30' N., the writer, about the middle of August, 1892, was impressed with the splendid appearance of Mars. The planet shone with a brilliancy that was almost, if not altogether, as great as it was at the opposition of 1877. Venus and Jupiter, also, seemed to have received extra touches of brilliancy that generally are not so pronounced in latitude 39° N.

Guaymas, located as it is on the shore of the Gulf of California, and surrounded by mountains ranging from a thousand to two thousand feet in height, with a sky that is always of the deepest blue, possesses advantages of a very superior kind, for an astronomical observatory. The great objection to such a location, to a northerner, would be the intense heat of the summer. In addition to the advantages for astronomical work, the harbor of Guaymas, as well as the Gulf itself, offers facilities and material for the study of marine life, that are beyond a doubt unsurpassed. A well-equipped biological station and some good biologists would soon furnish to the scientific world splendid results.

At midnight of August 18, 1892, as the writer was entering the open court of a large adobe house in Guaymas, in company with two or three friends, one of the most beautiful of celestial sights greeted their astonished vision. Suddenly from blue concave of the heavens, about midway between the zenith and the pole star, a meteor of the largest size shot out with a splendor of color such as is not often seen. The orange, red, violet, and other colors, were deep and most handsome to behold. Apparently, the meteor seemed to be moving from its initial point in a southerly direction, and had a disc, so to speak, almost equal to

that of the full moon, and a train following that was remarkable for its width as well as its length. The train was broken into blocks of color that made this celestial visitant in all its outline, size, color, and general appearance, an intensely interesting object.

The stream of meteors, called the Andromedes, which our planet encountered on the 23d of November, made a very good display here in Kansas. Although no attempt was made to count the number or estimate the total fall of meteors during the night, except at intervals of five or ten minutes, yet judging from what was done in this discontinuous manner, there must have been an average of from sixty to one hundred meteors per minute from 9 to 11 P.M. The "radiant point" was in Andromeda, from which by far the greater number seemed to start. Many others, apparently, had no connection with the "radiant," for they shot out from other points of the sky and at every moment. Generally, the meteors were small, but at times one more brilliant than the others appeared, adding very much to the interest of the observer. During the next four nights following the night of the 23d, it was hoped that a finer display would make its appearance, but two of the nights were overcast with clouds, and the other two, although clear, offered no show.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Breathing Wells.

REFERRING to the article of Mr. J. T. Willard in *Science* for Dec. 16, with reference to a "breathing well" in Kansas, I would say that such wells are also common in Nebraska. I have compared their behavior with the fluctuations of the barometer, and my observations agree with those of the writer in showing the entire dependence of the air movements in the well upon the changes in the atmospheric pressure outside. The cessation of an outward current from the well always corresponds with a curve of barometric depression, but always occurs some hours later than the minimum of pressure, and the amount of retardation depends upon the slowness with which the barometer rises.

These wells have often given considerable trouble in cold weather as the influx of cold air is liable to freeze the water in the pump at a considerable depth below the surface of the ground.

GOODWIN D. SWEZEY.

Crete, Neb., Dec. 23.

Hybridism in Genus *Colaptes*.

ACCORDING to the *résumé* of hybridism in the genus *Colaptes* by Professor Rhoads in *Science* for Dec. 9, it would appear that King's River was out of the limit of variation. Still I found one adult male of *C. cafer* at Dunlap, Cal., in the Sierra Nevadas, about 3,500 feet elevation, a perfect representative in every way save the occipital mark of *C. auratus*.

I also found an adult male in Cantua Creek, in the coast range, with the same marking. The former was in January, 1891, the latter in April, 1892. As both of these were found dead, I thought possibly the marking might have been caused by old age; but more probably they were stragglers from the north.

ALVAH A. EATON.

Riverdale, Cal., Dec. 26.

How Shall I Study Ants?

CAN some naturalist refer me to some article or book, or tell me himself how I can best keep a colony of ants, for inspection.

DWIGHT GODDARD.

Hosmer Hall, Hartford, Conn., Jan. 6.